



Annual Report of Operations for Year 2019

To comply with NPDES General Permit No. WAG130000 for Federal Aquaculture Facilities and Aquaculture Facilities Located in Indian Country within the Boundaries of the State of Washington

NPDES # for your Facility:

WAG-13000-6

Facility & Owner Information

Facility Name: Spring Creek National Fish Hatchery	
Operator Name (Permittee): USDOI/USFWS/Spring Creek NFH	
Address: 61552 State Road 14 Underwood, WA 98651	
Email: david_carie@fws.gov	Phone: (509) 493-1730
Owner Name (if different from operator): Same	
Email:	Phone:

Best Management Practices (BMP) Plan

Has the BMP Plan been reviewed this year?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Does the BMP Plan fulfill the requirements of the General Permit?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Summarize any changes to the BMP Plan since the last annual report. Attach additional pages if necessary.	
Added the circular pond to the rearing units section: The circular pond will be for display only, not used for production fish. Currently it is not used but will be used to house White Sturgeon for fish viewing.	
Water measurements section, beginning in 2020, a Hobo Box Water Level Station will be installed and will measure the effluent discharge from the FFSB.	
Specific drug use section - Aqua Des™ will be used to disinfect spawning room surfaces, pond walls. Also used to disinfect burrows ponds and filter-beds after rearing and spawning season.	

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Operations and Production

Total harvestable weight produced in the past calendar year in pounds (lbs): **101,486 pounds**
Pounds of food fed to fish during the maximum month:
24,024 pounds in March

List the species grown or held at your facility and the annual production of each in gross harvestable weight. If fish were released rather than harvested, list the weight at time of release.

Species	Fish Produced	Receiving Water(s) to which Fish were Released	Month Released/Spawned
Fall Chinook	Smolts	Columbia River	April and May

Fill in the table below with production numbers from the past year. List the **maximum** amount of fish on-site and the maximum amount of food fed **per month**.

Month	Total Fish (lbs)	Fish Feed (lbs)	Month	Total Fish (lbs)	Fish Feed (lbs)
January	18548	5280	July	NA	NA
February	39109	12232	August	NA	NA
March	71659	24024	September	NA	NA
April	42041	18612	October	NA	NA
May	49460	2684	November	NA	NA
June	NA	NA	December	6026	88

Additional Comments: April 8th - 6,919,542 fish released into Columbia River.
May 6th - 3,971,146 fish released into Columbia River.

Prior to the April 8th release - this is the maximum number of fish on site. March had the maximum amount of food fed 24,024 pounds.

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Solid Waste Disposal

Describe the solid waste disposed of during the calendar year (including fish mortalities).

Type of Solid Disposed	Date Disposed	Location Disposed
Fish mortalities	Entire rearing year	Digestion tank
Additional Comments:		

Fish Mortalities

Include a description and the dates of mass mortalities in the past year (more than 5% per week). Attach additional pages, if necessary. Include total mortalities from all causes.

Date	Cause of Deaths	Steps Taken to Correct Problem	Pounds of Fish
NA	NA	NA	NA
Additional Comments:			

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Noncompliance Summary

Include a description and the dates of noncompliance events (including spills), the reasons for the incidents, and the steps taken to correct the problems. Attach additional pages, if necessary.

At no point this year were we in a state of non-compliance.

Inspections & Repairs for Production & Wastewater Treatment Systems

Date Inspected	Date Repaired	Description of System Inspected and/or Repaired
		Our production and wastewater treatment systems
		are inspected continuously by maintenance staff.
5/20/2019	9/26/2019	One of the sump (effluent) pumps was removed and a
		new pump ordered, still waiting for it to show up.

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Aquaculture Drugs and Chemicals

Please indicate whether you used each drug/chemical **during the past calendar year**.

Describe the use of each drug/chemical in more detail on the following pages.

Used in the past year?	Drug or Chemical
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Azithromycin
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Chloramine-T: <i>See additional reporting requirements on page 7</i>
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Chlorine
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Draxxin
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Erythromycin - injectable
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Erythromycin - medicated feed
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Florfenicol (Aquaflor)
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Formalin - 37% formaldehyde: <i>See additional reporting requirements on page 7</i>
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Herbicide - describe:
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Hormone - describe:
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hydrogen Peroxide: <i>See additional reporting requirements on page 7</i>
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Iodine: <i>See additional reporting requirements on page 7</i>
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Oxytetracycline
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Potassium Permanganate: <i>See additional reporting requirements on page 7</i>
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Romet
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	SLICE (emamectin benzoate)
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Sodium Chloride - salt
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Vibrio vaccine
<input type="checkbox"/> Yes <input type="checkbox"/> No	Other:
<input type="checkbox"/> Yes <input type="checkbox"/> No	Other:

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Aquaculture Drugs and Chemicals (cont'd)

Describe all drug and/or chemical treatments that occurred during the year. Fill out the information below for each drug or chemical, plus page 7 for water-borne treatments. Attach additional pages as necessary.

Brand Name: Sodium Hypochlorite		Generic Name: Chlorine (bleach)	
Reason for use: Aquamats disinfection			
<input type="checkbox"/> Preventative/Prophylactic <input checked="" type="checkbox"/> As-needed	Total quantity of formulated product per treatment (specify units): 14 gallons	Total quantity of formulated product used in past year (specify units): 14 gallons	
Date(s) of treatment: May 10, 2019			Total number of treatments in past year: 1
Maximum daily volume of treated water: 29,000 gallons	Treatment concentration (specify units): 25 mg	Duration and frequency of treatment(s): One time application, held 24 hours	
Method of application:			
<input checked="" type="checkbox"/> Static Bath <input type="checkbox"/> Flow-through		<input type="checkbox"/> Medicated Feed <input type="checkbox"/> Other (describe):	
Location in facility chemical was used (check all that apply):			
<input type="checkbox"/> Raceways <input type="checkbox"/> Incubation building		<input checked="" type="checkbox"/> Ponds <input type="checkbox"/> Off-line settling basin	
Where did water treated with this chemical go? (check all that apply):			
<input type="checkbox"/> Discharged w/o treatment <input checked="" type="checkbox"/> Settling basin		<input type="checkbox"/> Septic System <input type="checkbox"/> Publicly owned treatment works	
Provide any additional information about how this chemical was used and/or special pollution prevention practices during use: Pond was sealed to prevent leaks and granular Sodium Thiosulfate was added to the channel. Sodium Thiosulfate was added to waste water lift station sump and water was pumped to lagoons (FFSB).			

Brand Name: Ovadine		Generic Name: Buffered Iodine	
Reason for use: Egg disinfection and soft shell preventative, disinfect bowls and collanders			
<input checked="" type="checkbox"/> Preventative/Prophylactic <input checked="" type="checkbox"/> As-needed	Total quantity of formulated product per treatment: 455 gallons	Total quantity of formulated product used in past year (specify units): 455 gallons	
Date(s) of treatment: 9/17/2019 - 10/29/2019			Total number of treatments in past year: 1
Maximum daily volume of treated water: 22,500 gallons	Treatment concentration (specify units): 20 mg	Duration and frequency of treatment(s): 15 minutes, 3 times weekly till fish hatch	
Method of application:			
<input type="checkbox"/> Static Bath <input checked="" type="checkbox"/> Flow-through		<input type="checkbox"/> Medicated Feed <input checked="" type="checkbox"/> Other (describe):	
Location in facility chemical was used (check all that apply):			
<input type="checkbox"/> Raceways <input checked="" type="checkbox"/> Incubation building		<input type="checkbox"/> Ponds <input type="checkbox"/> Off-line settling basin Spawning room	
Where did water treated with this chemical go? (check all that apply):			
<input type="checkbox"/> Discharged w/o treatment <input checked="" type="checkbox"/> Settling basin		<input type="checkbox"/> Septic System <input type="checkbox"/> Publicly owned treatment works	
Provide any additional information about how this chemical was used and/or special pollution prevention practices during use: 30 gallons added to the main hatchery water inlet, water diverted to (FFSB) afterward.			

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Aquaculture Drugs and Chemicals (cont'd)

Describe all drug and/or chemical treatments that occurred during the year. Fill out the information below for each drug or chemical, plus page 7 for water-borne treatments. Attach additional pages as necessary.

Brand Name: Aqua Des		Generic Name: Aqua Des	
Reason for use: Total Hatchery Disinfection			
<input type="checkbox"/> Preventative/Prophylactic <input checked="" type="checkbox"/> As-needed	Total quantity of formulated product per treatment (specify units): 625 gallons	Total quantity of formulated product used in past year (specify units): 900 gallons	
Date(s) of treatment: 10/28/2019 - 10/29/2019			Total number of treatments in past year: 1
Maximum daily volume of treated water: 3,326,611 gallons	Treatment concentration (specify units): 10 mg	Duration and frequency of treatment(s): One time application, held 24 hours	
Method of application:	<input checked="" type="checkbox"/> Static Bath <input type="checkbox"/> Flow-through	<input type="checkbox"/> Medicated Feed <input checked="" type="checkbox"/> Other (describe): Hatchery re-use system	
Location in facility chemical was used (check all that apply):	<input type="checkbox"/> Raceways <input type="checkbox"/> Incubation building	<input checked="" type="checkbox"/> Ponds <input type="checkbox"/> Off-line settling basin <input checked="" type="checkbox"/> Other (describe): Filterbeds	
Where did water treated with this chemical go? (check all that apply):	<input type="checkbox"/> Discharged w/o treatment <input checked="" type="checkbox"/> Settling basin	<input type="checkbox"/> Septic System <input type="checkbox"/> Publicly owned treatment works <input type="checkbox"/> Other (describe):	
Provide any additional information about how this chemical was used and/or special pollution prevention practices during use: Aqua Des was pumped out of the barrels and into the ponds and filter-beds. There was no fresh water flowing into the system, dam boards were put in channel to prevent water from entering fish ladder and dam boards to prevent water loss to north ponds, valves were closed to prevent water loss to the (FFSB), and overflow pipes in filter beds pipes were closed to prevent loss of water to (FFSB). After 24 hours and the Peracetic acid levels were not detected, new water was allowed to flow into the system and circulate. Water was then drained and pumped to the (FFSB).			

Brand Name: Tricaine Methanesulfonate		Generic Name: (MS-222)	
Reason for use: Fish anesthetic			
<input type="checkbox"/> Preventative/Prophylactic <input checked="" type="checkbox"/> As-needed	Total quantity of formulated product per treatment: 400 grams	Total quantity of formulated product used in past year (specify units): 7600 grams	
Date(s) of treatment: 9/16/2019 - 10/02/2019			Total number of treatments in past year: 19
Maximum daily volume of treated water: 1656 gallons	Treatment concentration (specify units): 0.24 g/gallon	Duration and frequency of treatment(s): 3-4 minutes	
Method of application:	<input checked="" type="checkbox"/> Static Bath <input type="checkbox"/> Flow-through	<input type="checkbox"/> Medicated Feed <input type="checkbox"/> Other (describe):	
Location in facility chemical was used (check all that apply):	<input type="checkbox"/> Raceways <input type="checkbox"/> Incubation building	<input type="checkbox"/> Ponds <input type="checkbox"/> Off-line settling basin <input checked="" type="checkbox"/> Other (describe): Spawning building	
Where did water treated with this chemical go? (check all that apply):	<input type="checkbox"/> Discharged w/o treatment <input checked="" type="checkbox"/> Settling basin	<input type="checkbox"/> Septic System <input type="checkbox"/> Publicly owned treatment works <input type="checkbox"/> Other (describe):	
Provide any additional information about how this chemical was used and/or special pollution prevention practices during use: 10-15 adult fish were anesthetized for 3-4 minutes prior to being checked for ripeness.			

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Aquaculture Drugs and Chemicals (cont'd)

Describe all drug and/or chemical treatments that occurred during the year. Fill out the information below for each drug or chemical, plus page 7 for water-borne treatments. Attach additional pages as necessary.

Brand Name: Magnesium sulfate		Generic Name: Epsom salt	
Reason for use: Treat Hexamita (Spironucleus) in the intestine			
<input type="checkbox"/> Preventative/Prophylactic <input checked="" type="checkbox"/> As-needed	Total quantity of formulated product per treatment (specify units): 21 lbs	Total quantity of formulated product used in past year (specify units): 63 lbs	
Date(s) of treatment: April 10, 2019 - April 23, 2019			Total number of treatments in past year: 3
Maximum daily volume of treated water: 42,916 gallons	Treatment concentration (specify units): 3%	Duration and frequency of treatment(s): 3% Epsom salt for 2 days	
Method of application:	<input type="checkbox"/> Static Bath <input type="checkbox"/> Flow-through	<input type="checkbox"/> Medicated Feed <input checked="" type="checkbox"/> Other (describe): Mixed with feed	
Location in facility chemical was used (check all that apply):	<input type="checkbox"/> Raceways <input type="checkbox"/> Incubation building	<input checked="" type="checkbox"/> Ponds <input type="checkbox"/> Off-line settling basin	<input type="checkbox"/> Other (describe):
Where did water treated with this chemical go? (check all that apply):	<input type="checkbox"/> Discharged w/o treatment <input checked="" type="checkbox"/> Settling basin	<input type="checkbox"/> Septic System <input type="checkbox"/> Publicly owned treatment works	<input type="checkbox"/> Other (describe):
Provide any additional information about how this chemical was used and/or special pollution prevention practices during use: 3% Epsom salt treatment for 2 days. Epsom salt was mixed in with feed.			

Brand Name:		Generic Name:	
Reason for use:			
<input type="checkbox"/> Preventative/Prophylactic <input type="checkbox"/> As-needed	Total quantity of formulated product per treatment:	Total quantity of formulated product used in past year (specify units):	
Date(s) of treatment:			Total number of treatments in past year:
Maximum daily volume of treated water:	Treatment concentration (specify units):	Duration and frequency of treatment(s):	
Method of application:	<input type="checkbox"/> Static Bath <input type="checkbox"/> Flow-through	<input type="checkbox"/> Medicated Feed <input type="checkbox"/> Other (describe):	
Location in facility chemical was used (check all that apply):	<input type="checkbox"/> Raceways <input type="checkbox"/> Incubation building	<input type="checkbox"/> Ponds <input type="checkbox"/> Off-line settling basin	<input type="checkbox"/> Other (describe):
Where did water treated with this chemical go? (check all that apply):	<input type="checkbox"/> Discharged w/o treatment <input type="checkbox"/> Settling basin	<input type="checkbox"/> Septic System <input type="checkbox"/> Publicly owned treatment works	<input type="checkbox"/> Other (describe):
Provide any additional information about how this chemical was used and/or special pollution prevention practices during use:			

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Aquaculture Drugs and Chemicals (cont'd)

Additional Reporting Requirements for Water-Borne Treatments

- If a water-borne treatment was used during the calendar year, Permittees must include detailed records/calculations as an attachment to this Annual Report in order to demonstrate how the maximum effluent concentrations of solution and active ingredient were calculated for each chemical.
- EPA recognizes that water-borne treatments may vary in the volume of the vessels treated, concentration, quantity of product, etc. Permittees must provide the information listed in the following tables for a reasonable worst case (i.e., maximum effluent concentration) scenario, not for each individual treatment.
- Permittees must submit this information and calculate the maximum effluent concentration for each water-borne chemical used during the past calendar year.
- See also Appendix D for the Chemical Log Sheet.

Static Bath Treatments		
Tank Volume	10,8311	Liters
Desired Static Bath Treatment Concentration	250	µg/L
Volume of Product Needed	52.99	Liters Product
Maximum Effluent Concentration of: 1) Solution and 2) Active Ingredient	Solution: Clorox bleach, 5.25% Active Ingredient: Sodium hypochlorite	Specify Units
Minimum Volume of Total (treated + untreated) Water Discharged from the Facility per day	2,880,000 gallons	Specify Units
Maximum % of Facility Discharge Treated	0.99	% of Total Discharge

Flow-Through Treatments		
Tank Volume	121.3	Liters
Calculated Flow Rate	18.9	Liters/Minute
Duration of Treatment	15	Minutes
Desired Flow-Through Treatment Concentration of Product	20,000	µg/L
Amount of Product to Add Initially	113.5	Liters Product
Amount of Product to Add During Treatment	7570.8	mL/Minute
Total Volume of Product Needed	113.5	Liters Product
Maximum Effluent Concentration of: 1) Solution and 2) Active Ingredient	Solution: Ovadine, 10% Active Ingredient: Polyvinylpyrrolidone	Specify Units
Minimum Volume of Total (treated + untreated) Water Discharged from the Facility per day	2,880,000 gallons	Specify Units
Maximum % of Facility Discharge Treated	0.3	% of Total Discharge

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Aquaculture Drugs and Chemicals (cont'd)

Additional Reporting Requirements for Water-Borne Treatments

- If a water-borne treatment was used during the calendar year, Permittees must include detailed records/calculations as an attachment to this Annual Report in order to demonstrate how the maximum effluent concentrations of solution and active ingredient were calculated for each chemical.
- EPA recognizes that water-borne treatments may vary in the volume of the vessels treated, concentration, quantity of product, etc. Permittees must provide the information listed in the following tables for a reasonable worst case (i.e., maximum effluent concentration) scenario, not for each individual treatment.
- Permittees must submit this information and calculate the maximum effluent concentration for each water-borne chemical used during the past calendar year.
- See also Appendix D for the Chemical Log Sheet.

Static Bath Treatments		
Tank Volume	12,592,586	Liters
Desired Static Bath Treatment Concentration	10,000	µg/L
Volume of Product Needed	2354.5	Liters Product
Maximum Effluent Concentration of: 1) Solution and 2) Active Ingredient	Solution: Aqua Des, 23% Hydrogen peroxide, Active Ingredient: 5.3% Peroxyacetic acid Specify Units	
Minimum Volume of Total (treated + untreated) Water Discharged from the Facility per day	3,326,611 gallons	Specify Units
Maximum % of Facility Discharge Treated	100	% of Total Discharge

Flow-Through Treatments		
Tank Volume		Liters
Calculated Flow Rate		Liters/Minute
Duration of Treatment		Minutes
Desired Flow-Through Treatment Concentration of Product		µg/L
Amount of Product to Add Initially		Liters Product
Amount of Product to Add During Treatment		mL/Minute
Total Volume of Product Needed		Liters Product
Maximum Effluent Concentration of: 1) Solution and 2) Active Ingredient	Solution: Active Ingredient: Specify Units	
Minimum Volume of Total (treated + untreated) Water Discharged from the Facility per day		Specify Units
Maximum % of Facility Discharge Treated		% of Total Discharge

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Aquaculture Drugs and Chemicals (cont'd)

Additional Reporting Requirements for Water-Borne Treatments

- If a water-borne treatment was used during the calendar year, Permittees must include detailed records/calculations as an attachment to this Annual Report in order to demonstrate how the maximum effluent concentrations of solution and active ingredient were calculated for each chemical.
- EPA recognizes that water-borne treatments may vary in the volume of the vessels treated, concentration, quantity of product, etc. Permittees must provide the information listed in the following tables for a reasonable worst case (i.e., maximum effluent concentration) scenario, not for each individual treatment.
- Permittees must submit this information and calculate the maximum effluent concentration for each water-borne chemical used during the past calendar year.
- See also Appendix D for the Chemical Log Sheet.

Static Bath Treatments	
Tank Volume	6268.6 Liters
Desired Static Bath Treatment Concentration	63800 µg/L
Volume of Product Needed	400 grams Liters Product
Maximum Effluent Concentration of: 1) Solution and 2) Active Ingredient	Solution: Tricaine methanesulfonate Active Ingredient: MS-222 Specify Units
Minimum Volume of Total (treated + untreated) Water Discharged from the Facility per day	2,880,000 Specify Units
Maximum % of Facility Discharge Treated	0.05 % of Total Discharge

Flow-Through Treatments	
Tank Volume	Liters
Calculated Flow Rate	Liters/Minute
Duration of Treatment	Minutes
Desired Flow-Through Treatment Concentration of Product	µg/L
Amount of Product to Add Initially	Liters Product
Amount of Product to Add During Treatment	mL/Minute
Total Volume of Product Needed	Liters Product
Maximum Effluent Concentration of: 1) Solution and 2) Active Ingredient	Solution: Active Ingredient: Specify Units
Minimum Volume of Total (treated + untreated) Water Discharged from the Facility per day	Specify Units
Maximum % of Facility Discharge Treated	% of Total Discharge

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Changes to the Facility or Operations

Describe any changes to the facility or operations since the last annual report.

Hatchery operations are similar to last years annual report. The only change that we made was eliminating the use of Sodium Hypochlorite (12.5%) for hatchery disinfecting after the spawning season.

We've been looking for alternatives to replace chlorine. After the spawning season, we used 10 ppm Aqua Des (23.0% Hydrogen Peroxide and 5.3% Peroxyacetic Acid) to disinfect the burrows ponds (adult holding ponds) and the filter-beds along with the pipe gallery making up the hatchery's re-use system.

Prior to disinfecting all the ponds and filter-beds, we preformed a trial test to compare different concentrations of the disinfectant. With the help of Kyle Farmer (DMV from Aquatactics Fish Health, Kirkland, Washington) we tested 4 concentrations in replicate ponds to determine which concentration would be best for our needs of a thorough disinfection without driving up the cost.

Signature and Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly evaluate and gather the information submitted. Based on my inquiry of the person or persons, who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

David Carie	Hatchery Manager
Printed name of person signing	Title
David Carie	12/6/19
Applicant Signature	Date Signed

Submittal Information

Send the complete, signed information, along with any attachments, to the following address:

U.S. EPA Region 10, OWW-191
Washington Hatchery Annual Report
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

Spring Creek NFH

Chemical calculations

Chlorine, Single Pond dosing formula (for Aquamat Disinfection)

Pond volume – 28,611 gallons

Final concentration – 25 ppm

Clorox bleach stock solution (1 gallon) – 5.25%

1 gallon = 3.785 liters

$$28,611 \text{ gallons} \times 25 \text{ ppm} \times 0.003785 / .0525 = 51,567.9$$

$$51,567.9 / 3,785 = 13.6 \text{ gallons}$$

Iodophor (Ovadine) Water Hardening

Tray Volume = 2 gallons

Ovadine stock solution – 1% buffered Iodine solution

Tray dosing formula: 40mL Iodine/2gallons water = 50 ppm

Iodophor Regular Prophylactic flow-through treatment methods:

Main Hatchery Water Inlet: 20ppm = 30.0 gallons delivery duration = 15 minutes

Tray volume = 2 gallons

Total trays – 4800 (300 stacks)

Total volume water – 9600 gallons

Saline Tank (Spawning room) – used for fertilization

Tank volume – 50 gallons (189.25 liters)

Final concentration – 3.75 ppm

Stock – Sodium chloride (99%)

Dosing formula: 1.5 lbs. salt / 50 gallons water = 710g salt / 189.25L water = 3.75ppt or 0.375% saline

Tricaine Methanesulfonate (MS-222) - Anesthetic tank

Tank volume – 1,656 gallons (6268 liters)

Final concentration – 63.8 mg/L

MS-222 – 400 grams

MS-222 Dosing formula: 400/6268 = 63.8 mg/L

Aqua Des™- Burrow ponds and filter-bed disinfection

Pond volume – 28,611 gallons (17 ponds = 486,421 gallons)

Filter-bed volume – 140,259 gallons (18 bays = 2,524,676 gallons)

Total volume – 3,326,611 gallons (includes pipe gallery, drain lines, supply lines)

Stock solution – 50,000 mg

Final concentration – 10 ppm

$$3,326,611 \text{ gallons} \times \frac{3.785 \text{ L}}{1 \text{ gal}} \times \frac{10 \text{ mg}}{1 \text{ L}} \times \frac{1 \text{ L}}{50,000 \text{ mg}} \times \frac{1 \text{ gal}}{3.785 \text{ L}} = 665 \text{ gallons (for 10 ppm)}$$

Aqua Des™- Spray bottle (5 gallon)

Stock solution – 50,000 mg

Final concentration – 500 ppm

$$5 \text{ gallons} \times \frac{3.785 \text{ L}}{1 \text{ gal}} \times \frac{500 \text{ mg}}{1 \text{ L}} \times \frac{1 \text{ L}}{50,000 \text{ mg}} \times 33.81 \text{ Oz./L} = 6.4 \text{ ounces}$$